STATEMENT

OF THE
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION
ON THE
U.S. ENVIRONMENTAL PROTECTION AGENCY'S

PROPOSED RULEMAKING ON CONTROL OF EMISSIONS FROM HIGHWAY MOTORCYCLES

Docket No. A-2000-02
September 17, 2002

Good morning. My name is Bruce Bertelsen and I am the Executive Director of the Manufacturers of Emission Controls Association (MECA). MECA is pleased to provide comments on EPA's proposed regulatory program to reduce emissions from highway motorcycles. We also plan to submit written comments and will include in those comments a discussion of the applicability of catalyst and related technologies to marine SI engines.

MECA is a non-profit association of the world's leading manufacturers of mobile source emission control technology. MECA's member companies have over 30 years of experience and a proven track record in developing and commercializing emission control technologies for motor vehicles. A number of our members have extensive experience in the development, manufacture, and commercial application of emission control technologies for motorcycles and mopeds. Our comments are based on research and development work being conducted by our members, their extensive experience in the field of mobile source emission control, and actual commercial experience in Europe and Asia where catalyst-based emission control equipment has been installed for over 10 years on two- and four-stroke SI engines used in two- and three-wheel vehicles.

SUMMARY

- MECA supports EPA's proposal to harmonize the levels of the standards for Class III motorcycles with California's standards. The standards are technologically feasible.

- MECA believes, however, that EPA should also harmonize with California's implementation date of 2008 for the Tier 2 standards, rather than delaying implementation by two years.

- EPA's proposed standards for Class I and Class II motorcycles could be strengthened by adopting standards that are based on the control capabilities of proven catalyst technology. One possible approach would be commit to harmonize the U.S. standards for Class I and Class II motorcycles with the European Commission's 2006 standards.

- MECA believes EPA's suggestion of extending the useful life requirements up to 40,000 km for Class III motorcycles is technologically feasible. Catalyst technology can be applied to help Class III motorcycles meet emission standards for extended periods.

- MECA recommends that EPA establish Blue Sky Standards in the range of 0.4 g/km HC+NOx for Class III and 0.5 g/km HC for Class I and II motorcycles to promote the technology development of and provide opportunities for additional emission control from highway motorcycles.

DISCUSSION

Catalyst technology is well developed for highway motorcycle application in the U.S. As discussed below, catalyst technology combined with improvements in engine and fuel delivery system design has been applied to two- and three-wheel vehicles powered with spark-ignited two- and four-stroke engines for a number of years throughout the world and has provided significant emission reductions of HC+NOx, CO, and, in the case of two-stroke engines, PM emissions. Objections to applying catalyst technology to two- and four-stroke motorcycles have included durability, packaging constraints, safety, performance, and cost of the systems. Actual commercial experience with both two-stroke and four-stroke two-wheel vehicles has demonstrated that all of these concerns are easily addressed.

Background

Catalyst Experience on Motorcycles -- Catalyst technology has been utilized successfully on motorcycles and mopeds for over 10 years. During that time, over 15 million two- and three-wheel vehicles have been equipped with catalyst systems. Taiwan was the first country to establish catalyst-based standards in 1992 and it subsequently tightened its standards twice more in the 1990s. Based on the resounding success of Taiwan's pioneering program and the effective performance of catalyst technology, other countries around the world have adopted or are planning to adopt control programs based on the use of catalyst technology, including Thailand, India, Malaysia, China, Japan, and countries in the European Union. Also, as EPA points out in its proposal, catalyst technology has been employed in some applications on both small two-stroke engines and large four-stroke engines.

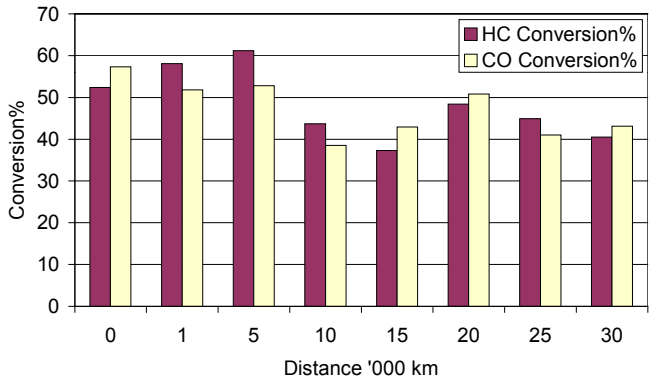
Catalyst Emission Control Capabilities -- Catalyst technology applied to two-stroke motorcycles and mopeds has demonstrated a capability of reducing emissions in the range of 50-60 percent for HC and 50-80 percent for CO, as reported in SAE Paper No. 2001-01-3814. If secondary air injection is used, control efficiencies in excess of 90 percent for both HC and CO can be achieved. For four-stroke engines, a three-way catalyst can achieve in excess of 90 percent HC+NOx and CO emissions.

Catalyst Durability – MECA member companies are designing and manufacturing catalyst technologies to successfully meet demanding durability requirements throughout the world. Catalyst technology has demonstrated outstanding durability on two-stroke engines, as shown in Figure 1, and on four-stroke SI engines as well. Indeed, catalyst manufacturers supplying the motorcycle market in Asia note that it is not uncommon for the two-stroke engine to fail before the catalyst.

Figure 1

Two-Stroke Catalyst Durability Over the Indian Drive Cycle

(ref. SAE Paper 2001-01-0003)



Four-stroke engine durability for motorcycles under similar aging and test evaluation conditions is expected to be as good or even better than that demonstrated in Figure 1 for two-stroke engines for the reason that lower engine-out emissions are associated with four-stroke engines and also because four-stroke engines have more advanced engine designs and fuel metering control.

To meet rigorous durability requirements experienced in actual use, catalyst technology is subjected to demanding catalyst aging and physical integrity evaluations. These tests include on-road durability demonstrations, bench testing where the catalyst-equipped engines are operated at wide open throttle for 100 hours, and/or hot vibration physical integrity tests in which the catalyst housing is subjected to cold water quenching and over 100 G force of vibration over extended periods of time (typically in the range of 100 hours). These durability tests are many times more severe than the operating conditions that a motorcycle would typically experience even under the most extreme actual operating conditions.

Control System Packaging/Impact on Performance – Some have argued that catalyst systems cannot be readily utilized on motorcycles because of packaging constraints associated with the limited space available on the vehicle to install the device, the greater space velocity through the catalyst compared to an automobile traveling at the same speed, and the potential backpressure build-up that could adversely affect performance. Packaging is an engineering challenge, but experience in related applications has clearly demonstrated that these challenges can be met. This is demonstrated by the fact that catalyst technology has been successfully designed, packaged, and equipped on over 15 million motorcycles worldwide.

Catalyst formulations and substrate designs have been developed, and continue to advance, which maximize emission control performance for small and larger SI engines like those used on motorcycles while minimizing the impact on backpressure and vehicle performance (see e.g., SAE Paper Nos. 2001-01-1821 and 2001-01-3814). A wide variety of concepts have been commercially applied to address the issue of limited space available on smaller vehicles. For example, in the case of on-road motorcycles and mopeds, packaging techniques have included placing the catalyst within the muffler system, mounting the catalyst close to the manifold, and using catalyst-coated plates and tubes, including flexible tube designs for exhaust pipes. These types of packaging strategies do not add any volume or complexity to the vehicle.

Operator Safety – Contrary to the claims of some, catalyst-based systems can be easily and safely applied to motorcycles. Indeed, the 10 year experience with on-road motorcycles and mopeds is proof of this fact. The countries that have successfully implemented catalyst-based regulatory programs have not identified any special safety issues associated with the use of catalyst technology on motorcycles and mopeds in real world applications. This fact is particularly significant given that it is not uncommon in India or Southeast Asia for catalyst-equipped motorcycles to carry two to four riders in all manner of attire.

Costs – Catalyst technology can be cost-effectively applied to highway motorcycles. Certainly, the cost of catalyst technology presented no roadblock to adopting or implementing catalyst-based motorcycle and moped standards in countries such as Taiwan, Thailand, China, and India where per capita income is much less than in the United States. Experience in countries with motorcycle emission control programs has shown that the costs of catalyst-based systems range from as low as $5 to up to about $100, depending on a variety of factors including the engine size, level of engine out emissions, level of the standards, packaging considerations, and the sales volume of catalyst systems.

Proposed Class III Standards

MECA supports EPA's proposal to harmonize the level of the federal standards for Class III motorcycles with California's standards, but we believe delaying the implementation date for the Tier 2 standards by two years is unnecessary. With regard to the Tier 2 standards, EPA notes in the proposal that one manufacturer has already been certified at levels meeting the 2008 California Tier 2 standard. Given the extensive experience and proven track record of catalyst technology in motorcycle applications, the continuing advances in automotive catalyst technology, which EPA rightfully points out can be applied to motorcycle applications, and the six-year lead time before the California Tier 2 standards go into effect, delaying the federal Tier 2 standards an additional two years cannot be justified on the basis of technological feasibility.

As EPA notes in the proposal, ARB will review in 2006 the technological progress in meeting the 2008 California Tier 2 standards and EPA will actively participate in that process. If EPA should conclude based on that review that manufacturers will be unable to meet the Tier 2 standards nationwide in 2008, the Agency could at that time propose a delay in implementing the federal Tier 2 standards.

MECA also believes EPA's suggestion to extend the useful life requirements for Class III motorcycles to 40,000 km is technologically feasible. As discussed above, catalyst technology has demonstrated excellent durability in motorcycle applications. In automotive applications,

catalyst technology is now being installed on vehicles with useful life requirements up to 150,000 miles (250,000 km) or more. Advanced catalyst technology developed for cars and light trucks is also available for motorcycle applications.

Class I and II Standards

EPA proposes that the emission standards for Class I and Class II motorcycles meet in 2006 the standards that have been in place in California since 1982. EPA notes that "virtually all Class I and Class II engines already meet and certify to the California standards." EPA also states, and MECA concurs, that catalyst technology is not expected to be needed for four-stroke motorcycles to comply. If future standards were based on the capability of employing catalyst technology on Class I and Class II motorcycles, HC+NOx could be further reduced by anywhere from 50 to greater than 90 percent. Catalyst technology is already being applied and has demonstrated its effectiveness on motorcycles in the Class I and Class II engine categories in Asia and elsewhere. MECA recommends that EPA, at a minimum, consider harmonizing the emission standards for Class I and Class II motorcycles with the European 2006 standards.

Voluntary Low Emission Standards

MECA recommends that EPA adopt Blue Sky Standards in the range of 0.4 g/km HC+NOx for Class III and 0.5 g/km HC for Class I and II motorcycles to promote the technology development of and provide opportunities for additional emission control from highway motorcycles. Catalyst and related technologies have continued to advance since California adopted the Tier 2 0.8 g/km HC+NOx standard in 1998.

MECA believes that by combining the advances in engine/fuel management and catalyst technology that can be applied to motorcycle engines such a level could be achieved. By applying catalyst technology to Class I and Class II motorcycles engines, a 50 percent reduction in HC emissions could easily be achieved.

Motorcycle manufacturers with a commitment to providing low emitting motor vehicle

products may very well choose to offer low emission motorcycle as well. By establishing voluntary Blue Sky Standards, EPA will help create an added incentive to produce such products.

CONCLUSION

In closing, MECA believes EPA's proposal is a good first step to reducing emissions from highway motorcycles. We believe, however, that EPA should strengthen its proposal as discussed above. We would welcome the opportunity to work with EPA, the regulated industry, and other interested parties as the Agency moves forward with finalizing this rule.

# # #